

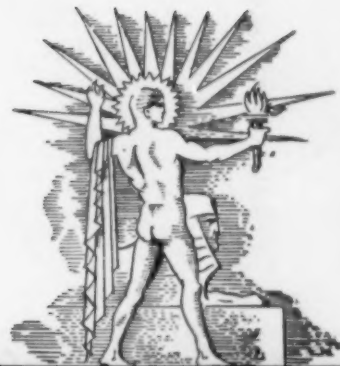
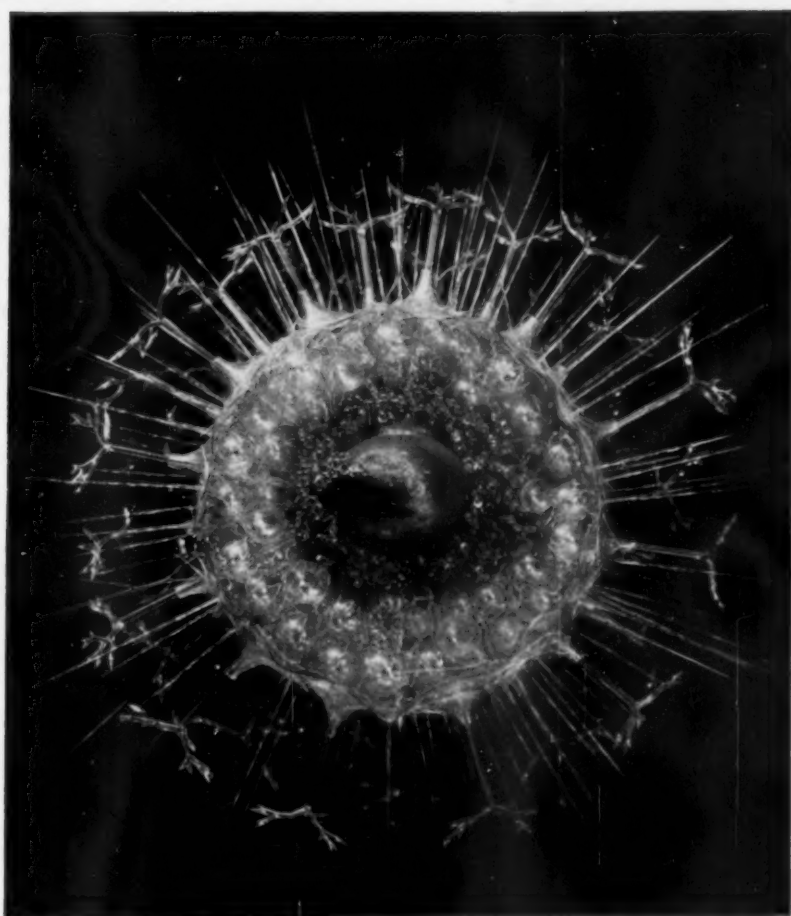
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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



DECEMBER 17, 1932

Like a Jewel from Fairyland

See Page 389

A

SCIENCE SERVICE PUBLICATION

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VOL. XXII

No. 610

The Weekly
Summary ofCurrent
Science

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DO YOU KNOW THAT

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Brazil nuts, popular in other lands, are not eaten in Brazil.

India produces a wild silk, using silkworms that feed on leaves of the castor-oil plant.

Humming-birds are famous for their small size, but there is a giant humming-bird that attains a length of over nine inches.

In the cotton growing states of Texas, Oklahoma, Arkansas, and Louisiana, physicians' net incomes dropped 50 per cent. in 1930.

The hazard of ocean liners colliding at night is reduced by a new funnel rising 68 feet above the top deck and brightly flood-lighted.

The Chinese were the first people to recognize the value of fingerprints for identification, says Dr. Berthold Laufer, anthropologist of the Field Museum.

A Hopi Indian says that the whorls of hair worn by Hopi girls over their ears do not represent squash blossoms, as is popularly supposed, but that the whorls symbolize butterfly wings.

The Senate Building of ancient Rome has been restored by Italian archaeologists, after many years of careful work.

One of the economic problems of modern medicine is that physicians normally collect only 80 per cent. of their charges.

A newly discovered cave in Maryland contains in its passageways unusual stalactite growths, some resembling convolutions of the brain.

Scientists who have been measuring the temperatures of snakes play safe by using an electric thermometer on the end of a bamboo pole.

Between 1920 and 1930, negro population in northern states increased 63 per cent.; in the West, 53 per cent. and in the South, five per cent.

Research into laundry methods, at Pennsylvania State College, have developed the standards that fabrics should not lose more than 25 per cent. of their tensile strength in 50 washings, or about two years' laundry wear; and that woollens and silks should shrink no more than 10 per cent. in 20 washings.

WITH THE SCIENCES THIS WEEK

Curiosity arousing questions for the teacher and general reader. Book references in italic type are not sources of information of the article, but are references for further reading. Books cited can be supplied by Librarian, Science Service, at publisher's price, prepaid in U. S.

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GEOGRAPHY

How did a heat wave help Arctic navigation? p. 385.

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What is Kmh? p. 389.

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Is beer intoxicating? p. 387. *Alcohol and Man*—Haven Emerson—Macmillan, 1932, \$3.50.
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PUBLIC HEALTH

Did the depression boost the pellagra rate? p. 386.
Is influenza spreading? p. 389.

ZOOLOGY

What is the object depicted on the front cover? p. 389. *Biology of the Protozoa*—Gary N. Calkins—Lea and Febiger, 1926, \$7.50.

GENERAL SCIENCE

New Government Groupings Expected to Promote Research

Division of Public Works in Interior Department Would be a Major Creation of President Hoover's Orders

SCIENTIFIC research will be promoted and not hindered by the reorganization of the federal executive departments which will be effective in February upon executive orders issued under Congressional authority by President Hoover and reported to Congress. This is the expected general feeling in scientific circles.

Unless Congress rejects the reorganization plans, the following major changes in organizational location of scientific and engineering bureaus of the federal government will be made:

The U. S. Public Health Service, now in the Treasury Department, will be transferred to the Interior Department and made part of a new division of education, health and recreation, which will include bureaus with these functions now largely in the Interior Department.

A new division of public works is also established in the Department of the Interior and practically all of the non-military engineering activities of the War Department, which include rivers and harbors, flood control, and similar work, are incorporated into it.

The Bureau of Public Roads, now in the Department of Agriculture, is placed in this public works division of the Interior Department, thus giving it jurisdiction over the extensive federal aid highway program.

The Treasury's Supervising Architect office is also transferred to the Interior's public works division, and numerous commissions and offices dealing with government construction and purchasing are brought together in the same division for economical administration.

The General Land Office of the Interior Department is given to the Department of Agriculture and grouped with the Forest Service, the Biological Survey and the Bureau of Chemistry and Soils, already in the department, into a division of land utilization.

The Hydrographic Office of the Navy and the Naval Observatory are incorporated into a new Department of Com-

merce merchant marine division, and the Hydrographic Office is merged with the Coast and Geodetic Survey. In the same new subdivision there will be located the United States Shipping Board Emergency Fleet Corporation.

The Weather Bureau, long in the Department of Agriculture, is fitted into the Commerce Department among bureaus that serve commerce and industry. The National Advisory Committee for Aeronautics, which has been an active independent research establishment since the World War days, is merged with Commerce's Bureau of Standards.

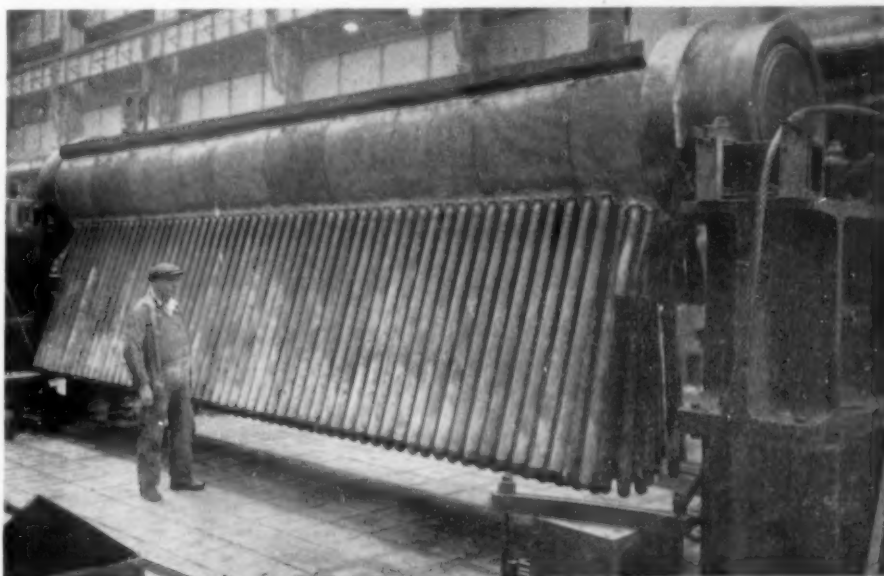
Those interested in the advance of public health are expected to view with favor the alignment of the U. S. Public Health Service in the education, health and recreation group of the Interior Department. The division of vital statistics of the Department of Commerce's census bureau is transferred to the Public Health Service and this is expected to facilitate the keeping of the nation's

health record. The health activities of the Children's Bureau of the Department of Labor are not affected, however, by President Hoover's orders, although the conflict in functions between the Children's Bureau and the Public Health Service has been discussed in the past.

The placing of engineering activities of the government under civilian control and the grouping of public works activities will undoubtedly meet with the acclaim of the engineering profession represented by the Engineering Council and other bodies. This move has been advocated by engineers in the past. Army officers will in the immediate future continue direction and operation of the public works activities that have been entrusted to the Army's Chief of Engineers, since President Hoover's orders provide that they shall be detailed to the Interior Department.

President Hoover in consolidating the Navy's Hydrographic Office with the U. S. Coast and Geodetic Survey brings together two bureaus that have had overlapping functions. Astronomers are expected to view with favor the transference of the Naval Observatory to civilian control in the Department of Commerce. Its superintendent has been a line naval officer detailed for relatively short tenure and, while this administration may be continued for a time after the transfer, it is expected that eventually the head will be a civilian.

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BRISTLING MERCURY BOILER

Mercury, replacing commonly used water, will be vaporized within this porcupine boiler drum to turn the 20,000-kilowatt turbine of a new power plant at Schenectady, N. Y. Seven boilers will be installed in the plant. They will require 270,000 pounds of mercury, which is 89 per cent. of the average annual consumption in the United States. A shipment this size has just been received for the Kearny station in New Jersey.

PHYSICS

Cosmic Rays Are Photons, Dr. Millikan Declares

**Latest Observations at Great Altitudes Held to Support
Theory of Interstellar Origin of Penetrating Radiations**

By **Dr. R. M. LANGER**, California
Institute of Technology

COSMIC RAYS are primarily light rays, or photons, which may be mixed to some extent with secondary charged particles, even when they enter the atmosphere. The rays originate out in interstellar space. These were the conclusions of a discussion of cosmic rays presented at the Mt. Wilson Observatory by Dr. R. A. Millikan, based on results made possible by recent advances in experimental technique developed at the California Institute of Technology.

Dr. Millikan acknowledged the assistance in this work of three especially able and resourceful young men, Drs. I. S. Bowen, C. D. Anderson, and V. H. Neher. Dr. Millikan said it was largely through their ingenuity that the new improvements were attained. The work was supported by the Carnegie Institution of Washington.

All observers, said Dr. Millikan, agree that the immediate agents through which the cosmic rays make their presence known are charged particles moving at such high speed that they disrupt atoms all along their path. There has been developed at the California Institute of Technology a photographic technique by which the energy of these particles has for the first time been directly measured. Over six hundred such photographs have been taken during the past year. They show the rays to be of enormous energy. They range from 40 million to 1,000 million volts, at least a hundred times larger than any that have been measured previously. The voltages below 500 million predominate. This has an important consequence, for it means that all those of less energy than 500 million must be secondary rays, produced in our atmosphere by primary cosmic rays, because charged particles with energy of even 1,000 million volts could barely penetrate the atmosphere. Indeed, Dr. Millikan showed photographs in which the actual formation of these secondaries could be seen taking place, for tracks sprang out of

lead interposed in the path of the cosmic ray beam when no tracks entered the lead.

The only agents which could produce such tracks without being seen themselves are photons. Dr. Millikan pointed out that this conclusion received complete support from all the recent careful experimenters working on the so-called latitude effect. They agree that there is no latitude effect in regions more than 30 degrees from the equator. Dr. Millikan himself has been looking for such an effect for several years with ever-improving methods. So far he has failed to find any evidence of it at sea level. At very high altitudes—in airplanes at 21,000 feet—there may possibly be some indication of a small effect.

Now, some observers have found small influences within 30 degrees of the equator. Dr. Millikan has not yet explored this region with his latest instruments and would not deny the possibility of such an effect. However, it does not weaken his argument that the

cosmic rays as they come into the atmosphere are primarily photons. A few electrons are necessarily generated by the photons in passing through tenuous matter in interstellar space. These would surely show a latitude effect if we could go to high enough altitudes and use sensitive enough instruments.

One of the most interesting results of the airplane flights was the rapid and continuous increase in cosmic ray intensity with altitude, especially between 19,000 and 21,000 feet. This is in agreement with previous work and shows a less penetrating component of the cosmic radiation which must account for most of the intensity observed near the top of the atmosphere. The primary rays at high altitudes are photons, most of which, from their penetrating power, are found to have energies in the neighborhood of 25 million volts.

Even the trained physicist must reflect a while before he can appreciate how conclusive a proof of the photon nature of cosmic rays is provided by this rapid rise in intensity with altitude coupled with the absence of any great latitude effect.

The interstellar origin of cosmic radiation is shown by the absence of any large or regular effect of the sun on cosmic rays. If the sun or milky way were responsible for a considerable portion of the cosmic radiation, the intensity would have to rise and fall according to the posi- (Turn to Next Page)

ASTRONOMY

Diminishing Moon to Eclipse Bright Star Regulus

STAR GAZERS in the southern and eastern parts of the country will see an interesting sight on the evening of Sunday, December 18, when the moon occults, or "eclipses," the bright star Regulus. Though every night the moon passes in front of some stars, it is very seldom that one as bright as Regulus is occulted.

Astronomers at the Naval Observatory in Washington will see the moon cover the star, which is of the 1.4 magnitude, at 9:41 p. m., Eastern Standard Time. At that time the moon, approaching last quarter and in a gibbous phase, will be low in the east. At 9:54 p. m.

the star will reappear. Farther north the time will be shorter, while in the southern part of the country it will be a little longer, and the times different. In the middle west and west, the occultation will be over when the moon rises.

Observations of the exact time of such occultation are important to astronomers, because by their aid the correctness of predictions of the moon's wandering through the sky can be checked. The positions of the stars are accurately known, and when the time of an occultation is found the exact position of the moon at that moment is known.

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GEOGRAPHY

Heat Wave Aids Small Boat to Sail "Impossible" Arctic Seas

THE "IMPOSSIBLE" feat of sailing around Franz Josef Land, in the North Polar regions, has been achieved by Russian explorers. They were aided by a heat wave from Florida which started in the Gulf Stream four years ago and moving slowly northward warmed the Polar Sea this year.

Experienced navigators have thought it impossible to sail a ship safely through the fickle seas north of Franz Josef Land, which lies far up toward the Pole. The leader of the Russian expedition, Prof. N. N. Subov, believed this uncharted polar region should be visited, and oceanographic data gathered.

The voyage was made in a small motor sailing craft of only 100 tons displacement and 125 horsepower.

"It was not luck but careful planning that made our success possible," said Prof. Subov, telling of the difficulties and how they were met.

So closely was the trip planned, that the little boat was loaded with only 30 days' fuel and 40 days' provisions, and no winter equipment. Prof. Subov had prepared maps, and had surveyed the temperature conditions of the region for past years. He predicted that the seas northeast of Franz Josef Land and towards Novaya Zemlya would be found free of ice, owing to the fact that a large volume of warm water from the Gulf Stream has been moving for four years slowly northward, and has had a marked effect on icebergs and sea temperatures along its route.

So strong was Prof. Subov's confidence that he could travel around Franz Josef Land on the crest of this warm wave this year, that he refused to turn back when confronted by a great ice-pack blockade east of Graham Bell Island. Warmer water must be present farther to the northeast, he was convinced. And moving in that direction, 25 miles, a passage to the south was found. The boat had a narrow escape on one occasion, being caught in an ice pack which nearly closed upon it.

September 20, thirty-four days after the little boat sailed from its starting point, Murmansk, it was back there again. Its fuel supply was down to a mere two-hour reserve. The food stores

had been eked out by two white bears, shot toward the latter part of the voyage.

One discovery announced by Prof. Subov is that the islands which Nansen named Eva and Liv after his wife and his daughter are in reality a single piece of land. The two ends are joined by a low stretch of land, the Russian explorers found.

"We charted it," said Prof. Subov, "and changed the name to Evaliv."

Describing the scientific observations made, Prof. Subov said:

"During our expedition we made 400 wire soundings at five-mile intervals. We made 38 full oceanographic stations at which temperature, salinity, oxygen, hydrogen ion concentration, phosphates, and nitrates were determined. We also investigated the distribution of plankton and benthos—forms of animal life at the sea bottom—and made the usual meteorological observations."

One practical application of the Arctic oceanographic studies is in the fishing industry of northern countries, which is directly affected by temperatures and other conditions of the Polar seas.

The most important results of the expedition, however, in Prof. Subov's opinion, is that it proved his ideas of forecasting Polar climatic conditions to be workable. The expedition also showed, he pointed out, that small boats can be very useful for oceanographic work in the high latitudes if climatic conditions are known beforehand.

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PHYSICS

Conservation of Energy Law Declared Unnecessary

THE LAW of conservation of energy which has been the cornerstone of physical theories for several generations may have to be discarded when dealing with certain atomic transformations. The conservation of energy is now doubted because identical radioactive atoms give off electrons of different energy and apparently continue to be identical so far as their energy is concerned.

Dr. Niels Bohr, the (Turn Page)



MISSISSIPPI FLOODS A LAWN

Here is the turbulent Father of Waters at flood stage, in miniature, from below Greenville, Miss., to the mouth of Old river. This reproduction of the Mississippi in reduced size at the U. S. Waterways Experiment Station, Vicksburg, Miss., has been called the largest river model ever built. It is used under the direction of Lieut. Herbert D. Vogel, of the Corps of Engineers of the U. S. Army to study the effect of structures designed to improve the river channel. The model is approximately 400 feet wide at the lower end and 120 feet wide at the upper end in the foreground. Twenty-four hundred feet of horizontal distance have been reduced to one foot and 120 feet of vertical distance to one foot. Notice the men in the background.

tion of one or the other. None of the recent work here or abroad shows a considerable effect of this character. Dr. Millikan has a great deal of data on this point. There are small and irregular variations but not of the sort which would result if the sun were the origin of the rays. Since they are, moreover, not produced on the earth they must come from the space outside.

The situation is in a very desirable state, Dr. Millikan pointed out. The leading experimenters everywhere are practically in complete accord as to the direct facts of observation. There are differences of opinion with regard to the interpretations to be applied to these facts. But in this matter of interpretation all physicists can join in the discussion. It will not be long before a generally acceptable conclusion will be reached as to the fundamental nature of the cosmic rays. The result will have consequences of most intense significance to theoretical physicists as well as to our notions of the structure of the universe.

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Danish physicist, was the first who expressed doubts concerning the validity of the principle of conservation of energy in subatomic phenomena.

At the recent meeting of the British Association in York and again at a physicists' conference in Leningrad, leading scientists discussed this momentous question.

"If we ignore the limitations placed upon us by the unnecessary conservation law, we are led to very interesting developments not only in the case of nuclear phenomena but also when dealing with the origin of solar energy," Dr. G. Gamow, young Russian physicist of the physical institute of the Academy of Sciences of Leningrad, said in an interview.

"The heart of a star," continued Dr. Gamow, "may be likened to one large atomic nucleus, a few inches or a few miles in diameter. Like the nucleus of the atom this central portion of the star can give off energy continuously, without thereby having its own store of energy or matter reduced. At the same time the star's central core, by breaking up into particles of different size, gives rise to the nuclei of all known elements. I am at present engaged in calculating upon a probability basis the relative abundance of the different elements originating in the central portion of the star. The final proportion of elements which should be present in a star depends upon other factors as well, for instance upon the lesser stability of the nuclei of the lighter elements under the bombardment of high velocity protons.

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DENTISTRY

Irregular Teeth To Be Subject of Research

IRREGULARITIES of the teeth are to be the subject of special research at Columbia University. This condition is scientifically known as malocclusion. A common form is seen in people with buck teeth. Malocclusion is found in all races and at all levels of society. Confusing theories as to its cause and results are held by both dentists and physicians, and even the present methods of treatment are unsatisfactory. Investigation of the subject at Columbia will be under the direction of Dr. Milo B. Hellman who has just been appointed professor of dentistry at the University.

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THE "THUNDER-BEAST" OF THE ANCIENT WEST

There were giants on the earth in the earlier days of the Age of Mammals, when streams of animal migration met and crossed on the Bering land bridge between the New World and the Old. Some of them were so weird and unwieldy that paleontologists have been put to it to find appropriate names for them. They have hit it off pretty well, however, in the case of the Titanotheres, "Titan-beasts," one of which, a Brontothere, or "thunder-beast," is here shown as it appears in a restoration-drawing made for the Smithsonian Institution Series, based on a skeleton in the U. S. National Museum.

PUBLIC HEALTH

Hard Times Disease Routed Even During Depression

DEATHS from pellagra, "hard times" disease, have unexpectedly decreased enormously during the present depression. Vegetable gardens and yeast seem to have effectually routed the former specter of economic depressions.

These two factors, together with education in pellagra-preventive measures, seem to have reduced the pellagra death-rate by about one-third in the face of the country's worst depression, it was shown in a discussion of the subject by Dr. William DeKleine of the American Red Cross at the meeting of the Florida Public Health Association at Ocala.

Dr. Joseph Goldberger of the U. S. Public Health Service showed before his death that pellagra is caused by lack of a certain factor in the diet. This factor is now called vitamin G. It is found in fresh vegetables, in lean meat and abundantly in dried yeast.

When the great flood of 1927 devastated large portions of the Mississippi Valley, the American Red Cross undertook to apply Dr. Goldberger's

findings. Dried yeast was distributed on a large scale. The residents of the area were encouraged to start home vegetable gardens, and more than 120,000 packages of seeds were distributed in 1927 and 1928. This action reintroduced gardening in many sections of the flood area where the farmers had previously depended on a cash crop, buying their own food at the stores and commissaries. Under this system, when the cash crop failed, they were unable to buy adequate food and having raised none themselves, fell victims to the hard-times disease, pellagra, Dr. DeKleine reasoned.

The introduction of the gardening in the flood areas was continued in other Southern states until 1932. In addition, housewives were shown how to can and preserve the garden foods for winter use. Dr. DeKleine believes it is this gardening and canning, in addition to the distribution of yeast and other health foods by the Red Cross and other relief agencies, which have caused the drop in pellagra deaths despite the depression.

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PHYSIOLOGY

Intoxicating Drink Cannot Be Scientifically Defined Now

Studies of Effects of Alcohol Reveal Variables Which Make it Impossible to Give Legislators Exact Definition

By JANE STAFFORD

LEGISLATORS seeking a definition of an intoxicating beverage will find that science cannot give them one at present. Drunkenness is a gradually developing condition. It would be arbitrary to draw a line at any point and say here intoxication begins. For a tight-rope walker it might be one thing, for an automobile driver another and for a peaceful pedestrian still another.

Common sense and experience must be used to determine practically what alcoholic beverages should be designated as intoxicating.

These are the opinions of Dr. W. H. Howell, chairman of the National Research Council and formerly director of the Johns Hopkins School of Hygiene and Public Health.

The subject has been investigated extensively in various scientific laboratories. That is, studies have been made of the effects of alcohol on the body and on efficiency in performing various acts and tests. While much has been learned, none of the results can be used to determine exactly a limit for the alcoholic content of an intoxicating beverage.

This is because of the wide difference in the way different persons are affected by alcohol, the difference in the way they ordinarily consume the same amount, and the difference between taking alcohol under laboratory conditions and drinking it on social occasions.

Measure Alcohol in Blood

While intoxication is a result of the effect of alcohol on the brain and the nervous system, there is no way to measure this directly in a living man, Prof. Walter R. Miles of Yale University has declared. Instead, Prof. Miles and other investigators have measured the amount of alcohol in the blood, believing that this value gives a fairly accurate picture of the amount in the nervous system at the same time.

When the concentration of alcohol in the blood reaches one-hundredth of one

per cent., the first effects of the alcohol may be observed in a "clearing of the head, freer breathing through the nasal passages and mild tingling of the mucous membrane of the mouth and throat."

At a concentration of five-hundredths of one per cent., the average person becomes intoxicated in the sense that he is a probable danger to himself and others. It is at this stage that he feels he is "sitting on top of the world," feels he can lick anybody in the county, takes social and personal liberties of all sorts as impulse prompts, is long-winded, and has difficulty in lighting a match.

When the concentration of alcohol in the blood reaches one-tenth of one per cent., there is no doubt at all that the drinker is intoxicated, Prof. Miles observed. At this stage he staggers noticeably, talks to himself, sings loudly, fumbles with his keys in unlocking his car and otherwise presents all the signs of a person "under the influence of liquor." A very strict definition of drunkenness is that of Dr. Howard A. Kelly, Emeritus professor of gynecology and obstetrics at Johns Hopkins University, who holds that any person who takes any quantity of alcohol of any dilution is intoxicated because alcohol is a toxic substance.

On the other hand, Dr. Raymond Pearl, director of the Institute for Biological Research, Johns Hopkins University, agrees with the idea of drunkenness said to be used by the London police,

"A man is drunk (in a police sense) if he is so under the influence of alcohol as to be a nuisance or a danger to himself or others."

A man driving an automobile may be such a danger for from two to four hours after drinking even moderate amounts of alcohol, scientific tests have shown.

"It is true that from two to four hours after very moderate doses of alcohol practically all individuals are affected

with general depression of neuro-muscular processes, lessened visual acuity, and lessened eye-hand coordinations," Dr. Francis G. Benedict of the Carnegie Institution Nutrition Laboratory pointed out. According to Dr. Benedict, "inflexible science" says to the modern automobile driver,

"Moderate user, keep off!" meaning keep off the roads. "For at least four hours after a dose of alcohol formerly considered 'permissible,' you, as a motor vehicle operator, may well be considered a 'menace to society.'"

However, one set of scientific experiments showed that after a man was accustomed to alcohol, his efficiency was increased rather than decreased immediately after taking a drink. This was true of his performance in various tests demanding a high degree of coordination between nerves and muscles. Yet even a person who had built up a tolerance for alcohol, as scientists call it, might not be safe driving a motor vehicle just after taking a drink.

Effect on Brain

One eminent biochemist with a scientist's knowledge of alcohol's effect on the body and with a liking for a sociable drink, never takes one if he is going to drive his car. Neither will he allow his son to drive if he has been drinking.

The best means of finding how much alcohol is needed to intoxicate a man, according to one group of scientists, is by determining the amount of alcohol in the brain, on the theory that it is the effect of the alcohol (Turn to Page 394)

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The Science Service radio address next week will be on the subject

UNCLE SAM'S REINDEER

by

Dr. W. B. Bell

Bureau of Biological Survey of the U. S. Department of Agriculture

FRIDAY, DEC. 23

at 12:45 P. M., Eastern Standard Time

Over Stations of The Columbia Broadcasting System

PSYCHOLOGY

**Wanted: Triplets
For Scientific Study****W**ANTED: Triplets.

Anyone knowing triplets is requested to send their names and addresses to the Institute of Child Welfare, University of Minnesota, Minneapolis.

A study of triplets is under way at the Institute, and Dr. John E. Anderson is finding them very difficult to locate.

Although there have been many investigations of the resemblances between brothers and sisters, identical twins and fraternal twins, no extensive study of triplets has been made, Dr. Anderson said in a letter to *Science*.

But because triplets may have their origin in a single egg cell, with consequently identical heredity, or in two or three egg cells, they offer a unique opportunity for scientists to secure information on the influence of heredity and environment.

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AVIATION

**New Bomber May Make
Pursuit Planes Obsolete**

A BOMBING airplane so speedy that it may outstrip the small fast pursuit ships of yesterday, making them obsolete, is being tested by the U. S. Army Air Corps at Wright Field, Dayton, Ohio.

The new plane is the result of improvements to the light Martin bomber XB-907 which, because of its emphasized streamlines, was dubbed the "flying fish" when announced last spring. The flying fish, a semi-low wing monoplane with metal fuselage and retractable landing gear, is powered by two Wright nine-cylinder radial engines. The engines are mounted in the front edge of the wing and are equipped with cowlings, both of these speed-producing features being developments of research by the National Advisory Committee for Aeronautics. It is understood that the new ship is much like its predecessor, with greater speed and maneuverability.

Although the Air Corps has not described this ship, engineers believe that its speed exceeds the 185 miles per hour achieved by the Boeing B-9 bomber. The Boeing plane, one of the best light bombardment airplanes, carries 2,000

pounds of explosives. Larger, slower and more clumsy bombers carry 4,000 pounds.

The gap between the speeds of heavy bombers and light pursuit ships is thus further decreased by the Martin development. A few years ago pursuit planes could fly circles around the bombers at speeds 30 per cent. greater than those of the big ships, while now they do well to overtake the bombardment planes whose speed they exceed by only about 10 per cent.

Some observers see, in this evolution of bombers into smaller, faster airships, the development of a universal battleship of the air with the speed and capacity of a bomber and the maneuverability of a pursuit ship.

Science News Letter, December 17, 1932

ENGINEERING

**Dust Layer Most Effective
When Not Dragged**

CALCIUM CHLORIDE, used as a protective mulch and for laying the dust on roads, is much more effective without the customary dragging of the road surface, Fred Burggraf, research engineer of the Highway Research Board, told the meeting of the Board in Washington.

The value of the salt mulch lies in the fact that it retards the evaporation of water from the road bed, tending to keep it in that ideal state when it is not so wet as to cause rutting nor yet dry enough to cause corrugations and the dust nuisance. In addition, the salt will absorb moisture from the air, serving to keep the road moist even when there is no rainfall.

The purpose of the frequent dragging of loose material over the road surface is entirely different. This procedure is to retard the formation of pot-holes. It does not reduce dust, and may even increase it. And, where the salt mulch is used with it, it grinds up the salt, thus destroying the mulch action and causing loss of the salt through dissipation by rain and wind.

The frequent-maintenance method was recommended by Mr. Burggraf for use during the fall months when lower temperatures make it necessary in order to insure a smooth riding surface. But the good service rendered by the salt mulch on a bare surface without maintenance during the summer makes it worthy of consideration in the low-cost road program, Mr. Burggraf said.

Science News Letter, December 17, 1932

IN SCIENCE

ARCHAEOLOGY

**Archaeologists Tunnel Into
World's Largest Pyramid**

MEXICAN archaeologists who are exploring the heart of the world's largest pyramid at Cholula, have unearthed numerous stone stairways which lead to a 130-foot paved platform.

The adobe pyramid is now honeycombed by some 1,000 feet of tunnels made by the archaeologists. The tunnels are enabling the explorers to reveal the interior complex of structures without disturbing the Spanish colonial church which now stands on top.

One stairway which has been found is over 160 feet wide, and is the widest stairway known in American archaeology. It appears to have been rebuilt four times. Its destination has not yet been revealed by the excavations.

The great pyramid is being excavated under the direction of the engineer Emilio Cuevas of the Mexican Direction of Archaeology.

Science News Letter, December 17, 1932

EXPLORATION

**Chicago Fair to Show
Beebe and Piccard Spheres**

THE METAL SPHERES that have carried man highest above the surface of the earth and deepest below the ocean's surface are scheduled exhibits at the Century of Progress International Exhibition which opens in Chicago June 1 of next year.

Dr. William Beebe, zoologist-explorer of the New York Zoological Society, has promised the loan of the bathysphere in which he descended 2,200 feet into the sea off Bermuda.

Dr. Auguste Piccard, the Belgian physicist, is being asked to lend the aluminum gondola of the balloon in which he ascended nearly eleven miles the past summer over Europe.

The two spheres will be shown in the center of the Hall of Science's largest exhibition hall, the Piccard gondola suspended in the air over the Beebe bathysphere.

Science News Letter, December 17, 1932

EN FIELDS

SEISMOLOGY

Earth Shocks Felt in Peru, Mexico and New York

THE HIGH Andes of Peru, north of Lake Titicaca, were shaken by an earthquake early Friday morning, Dec. 9, according to calculations by scientists of the U. S. Coast and Geodetic Survey, based on data gathered by telegraph and radio by Science Service. The calculations showed the quake as centering in 14.5 degrees south latitude, 71 degrees west longitude. Time of origin was 3:35 a. m., eastern standard time.

The floor of the Pacific Ocean off the Mexican coast, south of Colima, was shaken by an earthquake Wednesday morning, Dec. 7. This area is a very active earthquake region.

The quake occurred at 11:22 a. m., Eastern Standard Time, and its epicenter as determined by the Coast and Geodetic Survey was in approximately 18 degrees north latitude, 103.5 degrees west longitude.

A single earthquake shock was felt at Saranac Lake, N. Y. at about 10:15 p. m., Tuesday, Dec. 6, the U. S. Geological Survey has been informed by Fred C. Conrad, postmaster.

Science News Letter, December 17, 1932

INDUSTRIAL MANAGEMENT

"KMH" Analysis Shows 35-Hour Week is Best

KMH TESTS show the 35-hour working week to be best for industry. This was one of the conclusions in a study presented at the meeting of the American Society of Mechanical Engineers in New York, by L. P. Alford and J. E. Hannum, New York engineers and editors.

Kmh means "kilo-man-hour." It is a unit devised by Mr. Alford and Mr. Hannum some years ago, and has been under practical test in a number of industries since 1927. It measures the production performance of each worker in blocks of a thousand hours.

Applying this yardstick to workers' effort, the two investigators have turned

up a number of facts which do not jibe with assumptions that have come to be almost orthodox dogmas to many industrialists. They found, for example, that the optimum size of an industrial plant for most effective production is small when indicated by kmh worked per year or number of workers. The optimum number of workers for a blast-furnace plant, it was discovered, ranges from 135 to 320; for petroleum refining the best results are obtained at plants employing from 20 to 70 workers, and in lumber manufacturing the most efficient plants employ between 25 and 150 men.

The analysis also showed that 58 per cent. of all manufacturing firms reporting showed a higher productivity per man in 1931 than in 1928. And the concerns which showed a continuous increase in the kmh rate of production from 1923 to 1931 reduced, on an average, the number of kmh per unit of product by 31 per cent. That is, if the working force of 1923 had remained unchanged, the amount of product turned out in a 35-hour week in 1931 would have been the same as was produced in a 51-hour week in 1923.

Science News Letter, December 17, 1932

INVENTION

New Device Tells Changes in Speed

A DEVICE that gives a direct quantitative measurement of the acceleration of a train when it speeds up, or of its retardation when the brakes are applied, has been invented by W. E. Potter of the General Electric Company. The instrument also tells the grade when the train is on a hill.

It "consists basically of a glass tube bent in the shape of a rectangle and partly filled with mercury. This is mounted on a flat base, so that it may be set on a window-sill, parallel to the vehicle's line of direction. The glass column toward the rear is marked off in miles per hour per second above and below a central zero position. The front column is marked off in per cent. grade, above and below a zero.

When the vehicle speeds up or slows down, the surge of the mercury up or down in the tube gives a direct reading of acceleration or retardation. When the speed is uniform, and also when the car is standing still, the mercury column goes back to the zero mark.

Science News Letter, December 17, 1932

PUBLIC HEALTH

Influenza Outbreak Creeping Into North

NEW increases in influenza are reported from the South and West and the outbreak seems to be creeping into the Middle West. Reports from state health officers to the U. S. Public Health Service give the total for the week ending Dec. 3 as 14,291, which is more than twice the total for the previous week.

Alabama, Tennessee, South Carolina, Louisiana, Colorado, New Mexico, Arizona and California reported the largest number of cases. Increases in Oklahoma, Missouri, Indiana and Kansas lead health authorities to believe that the outbreak will not be limited to the South and West. The New England and other northeastern states have so far not been affected. No cause for alarm is felt, however. The disease is occurring in mild form.

The present outbreak has not yet equalled the severe influenza epidemic of 1928. Health authorities point out that we have been fortunate in escaping any serious epidemics during the past three years of financial depression and unemployment.

Science News Letter, December 17, 1932

ZOOLOGY

Beauty Frozen in Glass Serves Cause of Science

See Front Cover

GEMS as fantastically beautiful as any that have ever glittered in dreams of a frosty Christmas fairyland are being made in glass for the American Museum of Natural History, by Herman Mueller, reputed to be the world's most skillful glassblower. They are not mere conventional designs, however, nor are they portrayals of imaginary creatures. They are enlargements, on a vast scale, of the strange and often delicately beautiful microscopic plants and animals that swarm unnoticed in the world of waters.

Mr. Mueller was once glassblower for Tiffany's, but as medieval and renaissance artists often reserved their best efforts for the service of the Church, so he has withdrawn his labors from the service of fashion to dedicate them to the advancement of popular knowledge of science.

Science News Letter, December 17, 1932

PHYSIOLOGY

Scientists Differ on Role Of Cigarette Tar in Cancer

CIGARETTES are both blamed with and exonerated of the charge of causing cancer in two divergent articles made public in the *American Journal of Cancer*.

Dr. William D. McNally, assistant clinical professor of medicine at Rush Medical College, Chicago, holds that the tar of cigarette smoke contains irritating substances which could account for the recorded increase of cancer of the lung.

Dr. Emil Bogen and his associate, Russell N. Loomis of Olive View, Calif., contend that whatever cancer-producing effect the use of tobacco may have, it cannot be ascribed to the chemical effect of the tar in tobacco smoke or distillate.

The tar of cigarette smoke, Dr. McNally found, contains nicotine, ammonia and other substances, all irritating, which could account for "cigarette cough," for the chronic bronchitis of the cigarette smoker, and for a condition found in heavy smokers known as leukoplakia, or smokers' tongue or smokers' patches. These irritating substances could also account for the increase in cancer of the lung which has been recorded in recent years.

"The temperature is not an important factor unless the cigarette is burned down to the last centimeter, when the hot smoke becomes more irritating," Dr. McNally reported.

"With a tarry residue of 4.84 to 15.29 per cent., a definite risk attaches to the smoking of a cigarette, especially since 6.56 to 11.58 per cent. may be absorbed or retained in the body. Cigarettes should not be smoked too short, as the last two centimeters retain most of the tar and other products of incomplete combustion."

Dr. McNally's report was based partly on observations of other investigators and partly on his own observations of the effect on rats of the water-soluble products from the smoke of 100 cigarettes. These were sprayed into the mouths of some rats, applied back of the ear to others and on shaved spots on the backs of still others.

Dr. Bogen and Mr. Loomis became interested in the effects of tobacco tar

when the advertising for a particular form of cigarette holder, which removes most of this tarry substance from the smoke, implied that the substance is harmful. When they started their inquiry there was a dearth of scientific information on the subject.

White Mice Tarred

In this study, tobacco tar was applied to the back of the necks of one group of white mice, and gas-house tar, known to have cancer-producing properties, was applied to the back of the necks of another group. In the first group there were no skin changes, while in the second, the usual common type of tar tumors appeared promptly.

"In the light of these findings, it appears highly improbable that the tar obtained during the act of smoking is an important factor in the development of cancer of the oral cavity of man," Dr. Bogen and Mr. Loomis concluded.

These findings, however, do not invalidate the prevailing, though not quite unanimous, clinical observation that cancer of the mouth is unduly prevalent

among persons accustomed to using tobacco. Even though the tarry substance settling out from the tobacco smoke may not show any cancer-producing properties, there are many other factors involved in smoking which may prove cancer-producing.

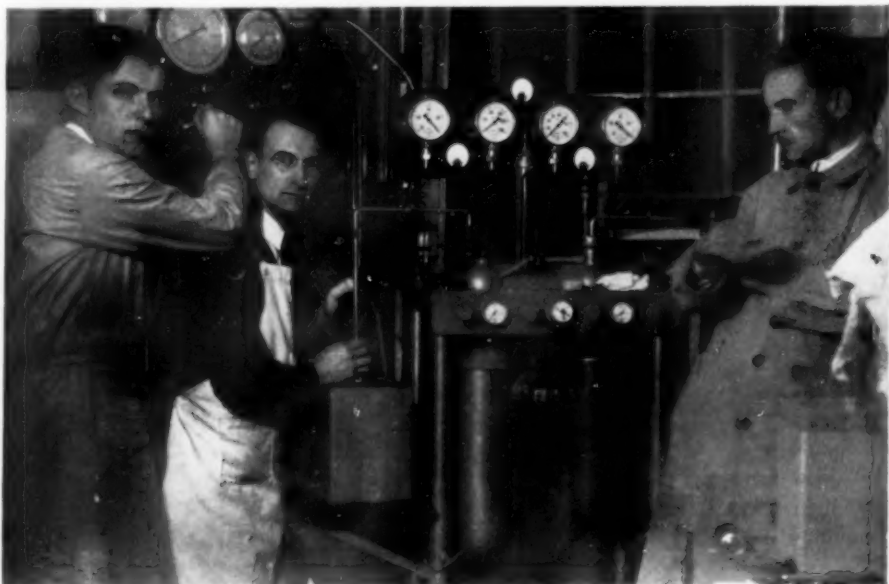
Among these the California investigators mentioned the mechanical irritation from the presence of a solid object in the mouth, such as pipe or cigarette holder; the temperature of the smoke which may produce imperceptible repeated burns of lips and tip of tongue; and the effect of other substances in the tobacco smoke, though there is as yet no evidence that any of these substances actually can produce cancer.

"Any substance so widely and commonly used as the cigarette cannot be as dangerous and deleterious as the propaganda of the more fanatical 'no tobacco' advocates might lead one to infer," the Californians pointed out.

Moderate amount of smoking may not produce visible injury to a sound individual, they reaffirm. However, the possibility of damage not perceptible by casual observation cannot be ruled out.

Science News Letter, December 17, 1932

Although the health movement in the South was slow in starting, and the difficulties were great, it has grown more rapidly there in the past twenty years than elsewhere in the United States.



TURNING ON THE COLD

Though they did not cause mercury in thermometers outdoors to fall, these scientists of the California Institute of Technology at Pasadena liquefied hydrogen at temperatures lower than 250 degrees below zero Centigrade (-418 degrees Fahrenheit) in the world's newest cryogenic laboratory being put in operation in Pasadena. They are, left to right, A. Foche and S. A. Macallister, and Dr. Alexander Goetz, in charge. The frigid liquid gases will enable scientists to penetrate a little-explored field, that is, the study of metals at extremely low temperatures.

MEDICINE

Epinephrin From the Suprarenal Capsule

"A Classic of Science"

**Dr. J. J. Abel, President of the American Association
For the Advancement of Science, Isolated Epinephrin**

ON EPINEPHRIN, the Active Constituent of the Suprarenal Capsule and its Compounds. By John J. Abel. In Proceedings of the American Physiological Society, Eleventh Annual Meeting, New York, Dec. 28, 29, and 30, 1898.

ACTING on Hyrtl's suggestion that *epinephris* would be the best name for the suprarenal capsule, the author has given the name Epinephrin to the active principle as isolated by him. . . .

The Active Principle

ON THE BLOOD-PRESSURE-RAISING CONSTITUENT OF THE SUPRARENAL CAPSULE. By John J. Abel, M. D., and Albert C. Crawford, M. D. In Johns Hopkins Hospital Bulletin, No. 76, Vol. VIII, Baltimore, 1897.

Both clinical experience and laboratory research have shown that the suprarenal capsule is an organ of vital importance.

Physiologists have proved that a very small quantity of an aqueous extract of the medullary substance raises the blood pressure to a great height above the normal. It has also unequalled power in reviving a poisoned heart. Gottlieb, for example, has shown that it will revive the heart of a rabbit which has practically stopped beating in consequence of an intravenous injection of chloral hydrate.

Bates applied an aqueous solution to the eye and found that it exerted a marked vaso-constricting action. In numerous cases of congestion a small quantity dropped into the conjunctival sac brought about an immediate pallor, lasting for some time. According to this writer the extract is very useful in prolonged operations, for, when repeatedly applied, hemorrhage is prevented and cocaine anaesthesia is in consequence indefinitely prolonged. As the result of his two years' use of the extract Bates concludes "that within the limits of its sphere of activity there is absolutely no

other substance which can take its place."

Other experiments go to show that the aqueous extract is a powerful poison when injected directly into the circulation and may lead to fatal results.

The various extracts that have been used in these experiments were mixtures of unknown substances, and it is as yet an unsolved question whether the various actions at present ascribed to the gland are due to one and the same substance.

We are at present interested in the isolation of the blood-pressure-raising constituent, for in a purified state, separated from all other constituents, it might become a therapeutic agent of great importance.

On the chemical side but little advance has been made over Vulpian's striking original contribution more than forty years ago. Vulpian observed that the juice expressed from the suprarenal capsule of many different animals behaved in a striking manner toward ferric chloride and toward solutions of iodine, giving with the former reagent an emerald green color, and with the latter a beautiful carmine tint. No other tissue of the body, so far as investigated by Vulpian, gave these reactions. . . .

[A list of tests for various chemical groups made upon the extract by many investigators follows.]

There is therefore at present great diversity of opinion as to the chemical character of the blood-pressure-raising constituents of the gland.

Whatever the probability may be of the correctness of this or that view, it is to be noted that all of the above-named investigators have based their conclusions on reactions made with aqueous, alcoholic or acetic extracts; none of them have even roughly isolated a definite chemical compound. The subject is one of great difficulty, and our own work is at present merely prelimi-

nary, but we have arrived at the following conclusions which we believe to be borne out by our experiments.

First, we have found by isolating the blood-pressure-raising constituent in the form of a benzoyl compound and decomposing it, that the active principle is a substance with basic characteristics and that it must in all probability be classed with the pyrrol compounds or with the pyridine bases or alkaloids.

Second, that pyrocatechin cannot be split off from the isolated active compound by boiling with acids, as has been asserted.

Third, we have found that a carmine-red pigment can be separated from the sulphate of the active principle without destroying its power to raise the blood pressure.

Fourth, in addition to this, we have isolated from the crude benzoyl product a volatile basic body which fumes in the air and which emits an odor very much like that of coniine. . . .

Blood-Pressure-Raising Constituent

We have now obtained the active principle in the form of a sulphate. As thus far isolated it is a hygroscopic, straw-colored residue which tends to crystallize on standing over sulphuric acid, agglomerates of small crystals forming on the edge of the bowl and the entire residue taking on a semi-crystalline appearance. This sulphate does not contain the volatile coniine-like substance, nor do we find the carmine-red pigment which falls out on the addition of an alkali. Alkalies no longer liberate the coniine-like substance nor do they throw out the red pigment, but they cause a brownish discoloration, and on heating, alkaline vapors, probably ammonia, are given off. . . .

Although somewhat contaminated with its own decomposition products, this final sulphate has all the characteristics of an active substance. As shown by repeated experiments, it promptly raises the blood pressure, it constricts the vessels of an inflamed eye, and when injected into the dorsal lymph sac of the frog it acts like a narcotic or cerebrospinal poison.

As freed of the red substance the sulphate of the active principle behaves as

follows: It is very soluble in water, fairly soluble in weak alcohol (50 per cent.), almost insoluble in absolute alcohol, and quite insoluble in ether, acetone, ligroine and chloroform. Its aqueous solution, even when freed from adherent sulphuric acid, has a slightly acid reaction. The addition of iodine water to a neutral solution does not give a rose-red color. Alkalies added to a strong solution give a brown color which deepens on heating. Ferric chloride gives a purplish brown, almost black in concentrated solution, which on the addition of tartaric acid and an alkali passes into a deep red color. Before the removal of the carmine-red substance the addition of ferric chloride gives the well-known emerald green color, which passes into red on the addition of an alkali.

It is evident that our sulphate gives Vulpian's ferric chloride reaction, though somewhat changed by the removal of what we take to be the chromogenic substance which gave his iodine reaction. It also promptly reduces silver nitrate in alkaline solution, but does not reduce Fehling's solution even on boiling.

Relation to Alkaloids

More than a year ago, during our first studies with suprarenal extract, we were struck with the fact that every extract entirely free of proteids and physiologically active gave a fine pyrrol reaction when subjected to dry distillation. This is evidenced both by the odor and by the pine sliver reaction. A small quantity of the isolated sulphate also gives the pyrrol reaction when heated either alone or with zinc dust.

We attach considerable importance to this reaction. As is well known, alkaloids in general give pyrrol on dry distillation; morphine, for instance, on being heated with 10 parts of zinc dust gives off pyrrol, ammonia, trimethylamine, pyridine, phenanthrene, etc.¹ During the past winter we made several attempts to prove the presence of pyridine among the products of dry distillation of the active principle as above isolated, as its detection would prove that our principle was to be classed among the alkaloids. . .

Summary

We may summarize the results of our work as follows:

The blood-pressure-raising constitu-

¹We are well aware that certain salts of glutamic, pyruvic and its related acids also yield pyrrol on dry distillation. These compounds, however, like the proteids and their allies, appear to us to be excluded.

ent of the suprarenal capsule may be completely precipitated from an aqueous extract by treatment with benzoyl chloride and sodium hydrate, according to the Schotten-Baumann method.

On decomposing the resulting benzoyl products, a residue is obtained which possesses great physiological activity. It gives the color reactions of Vulpian, reduces silver nitrate and possesses the other specific qualities of suprarenal extracts.

With the help of alkalies a carmine-red pigment may also be separated from these decomposition products. We take this pigment to be that one of the chromogenic substances of Vulpian which gives the rose-carmine color when suprarenal extracts are treated with oxidizing agents or alkalies.

A volatile, basic substance of a coni-

ine-like odor is always found to accompany the crude benzoate. When these substances are removed the active principle is left as a highly active sulphate or hydrochlorate, as the case may be. It is therefore a basic substance. Its salts give a color reaction with ferric chloride; they also reduce silver nitrate, but not Fehling's solution.

It is not possible to split off pyrocathechin from this isolated active principle. The fact that dry distillation causes the appearance of amines and pyrrol in abundance, taken in connection with its ability to take up acid radicles, its reducing power, its precipitability by cupric acetate and iodine chloride, and its physiological action, lead us to conclude that our active principle is to be classed with the pyridine bases or alkaloids.

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ENTOMOLOGY

Insects Artificially Digested To Determine Skeletal Weight

HOW MUCH does an insect's skeleton weigh?

This question has been accurately answered for the first time by Patrick Alfred Buxton, of the London School of Hygiene and Tropical Medicine.

Like many other scientists who make it their business to find out all they can about the lives of insects, he wanted to know as much as possible about their vital functions. He has been experimenting by exposing them to different conditions of dry and moist atmospheres, determining what sort of exposure does them the most harm. Yet many times, after he had noticed that insects lost both water and dry-material weight after exposure, he found himself faced with the problem:

Insects First Dried

"How much of what remains of this insect is living matter on which it could perhaps call for energy, and how much of it is 'dead' skeleton?"

He determined to find out.

Insects do not have large, bony skeletons like higher animals. Much of their "skeletons" are made of chitin, the horn-like substance that forms their shells and stings and sheaths. Mr. Buxton could not simply dissect an insect, take out all its bones, and weigh them.

Selecting a bunch of fat meal-worms,

he dried them out and removed all the fat with ether. The rest he put first into pepsin and then into pancreatin, which are two digestive juices. He had to powder the little dried bodies and break up the legs, and then coat them with a liquid that would make them sink in the juices. And so he let them digest—literally, just as they would be digested in the stomach of an animal—for three or four days. What was left, he weighed.

New Method for Suckers

When he came to use blood-sucking insects, however, he found that his digestive juices would not dissolve haematin, the dried blood-substance. He had to work out another method. Back he went to his meal-worms and using the results obtained by digesting for comparison, he found that dissolving powdered dried insects in potassium hydroxide solution at the boiling point for 24 hours would give the same results. And potassium hydroxide will dissolve haematin.

About one-twelfth of the body of a meal-worm is skeleton, Mr. Buxton discovered, but that is not the important thing. Other scientists now have, thanks to his work, a method by which they can find the skeletal proportion of any insect—if they ever happen to want to.

Science News Letter, December 17, 1932

NUTRITION

Dental Decay Caused by Lack Of Phosphorus and Vitamin D

LACK of phosphorus and vitamin D in the diet is the chief cause of dental decay, Dr. R. Gordon Agnew of West China Union University reported to the Board of Governors of the university meeting in New York. Dr. Agnew's report summarized his four years of research in which he analyzed three thousand diets.

Depriving animals of these two food elements produced tooth decay in almost one hundred per cent. of the cases. Experience with the diet of four hundred and fifty children of a Toronto institution bore out the results of Dr. Agnew's studies on animals.

"Our extensive experiments on laboratory animals and humans indicate that phosphorus and vitamin D are the important nutrient elements in the prevention of dental caries. With the laboratory animal phosphorus assumes a major role, but in humans, vitamin D becomes of great importance," Dr. Agnew stated.

Dr. Agnew's findings check with observations made in the laboratories of Dr. E. V. McCollum of Johns Hopkins University. Dr. McCollum and associates found that definite proportions of vitamin D, phosphorus and calcium were needed in the diet in order to prevent tooth decay. They explained this on the theory that the phosphorus was needed in the saliva to enable this secretion to act as a buffer solution, keeping enamel-destroying acid from accumulating. Without the proper amounts of calcium and vitamin D, however, they believed the phosphorus would not get into the blood and then the saliva.

Commenting on Dr. Agnew's work, Dr. McCollum called it one of the more important chapters in the history of nutritional research.

"The inference drawn from the research," he stated, "shows that if we get an adequate supply of vitamin D, plenty of milk, vegetables and other foods rich in phosphorus, we can nearly all prevent dental caries. In that event attendant diseases attributed to caries will be materially lessened.

"It so happens that the average American diet is built around the protective foods rich in phosphorus and calcium.

With a little care we can obtain the elements necessary to nutritional well-being, with the exception of vitamin D which is found chiefly in fish oils. Its natural source is found in the skin when activated by the ultraviolet rays of the sun. Unfortunately the sun in this latitude is seldom strong enough, so the natural source must be supplemented."

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ASTRONOMY

Ten-Year Sunspot Cycles Found in "Dearth" Periods

SUNSPOTS do not always grow more numerous at eleven-year intervals. There have also occurred periods in which the sun has very few spots at all, and during these "dearth" periods the low numbers that do show themselves probably reach their maxima at intervals of ten years instead of the usual eleven.

This was one of the points developed in a lecture at the Carnegie Institution in Washington by Dr. A. E. Douglass, astronomer at the University of Arizona. Dr. Douglass has done notable research on climatic cycles as revealed by the varying widths of growth-rings in trees, and by using these data in the examination of wooden beams he has been able to determine when Indian pueblos in the Southwest were built.

The most notable period of sunspot dearth since the beginning of modern astronomy, the speaker said, occurred in

the seventeenth and eighteenth centuries. During this time, the tree-ring records indicate, the eleven-year sunspot cycle was shortened to ten.

Indications of the occurrence of sunspot cycles have been found in tree-rings and other climatic records of prehistoric date at intervals for millions of years. These records have been studied in buried tree-stumps found in Southwestern canyons, in Ice Age trees excavated in Germany, in fossil redwoods in Yellowstone National Park that were green when three-toed horses roamed the earth, in the succession of thin clay layers of varves formed at the close of the Ice Age, and in certain Texas mineral deposits of Permian age, before the dinosaurs came.

Besides the eleven-year "normal" sunspot cycle, interrupted by occasional ten-year "dearth" cycles, sunspot maxima also show at least two other groupings, Dr. Douglass said. One of these is a period of a little over eight years, the other about fourteen years. These minor cycles often make the record hard to decipher, and it is only by mathematically "peeling them off" by means of what is called the cyclogram method, that the underlying main cycles become clearly distinguishable.

In his study of climatic cycles as recorded in tree rings, Prof. Douglass has examined and measured over a quarter of a million rings.

Science News Letter, December 17, 1932

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From Page 387

on the brain that produces intoxication. This is of much medico-legal value, but unfortunately does not help solve the problem of when a beverage is intoxicating, for such a test could only be made post-mortem.

Investigators of this problem, Prof. A. O. Gettler of New York University and A. Tiber, found that when the brain contained from 0.25 to 0.4 per cent. alcohol, the individual lost his sense of equilibrium and could be considered intoxicated. This finding resulted from a five-year study of over 6,000 human brains examined in the Chief Medical Examiner's Office of New York City, analysis of the histories of these cases, and experimental work on dogs.

The degree to which any person is affected does not depend on the amount of alcohol consumed but on the amount present in the brain at the time, this study showed.

Among investigators using the amount of alcohol in the blood as a test of intoxication is the English biochemist, Prof. E. E. Mellanby, who observed that when the concentration of alcohol in the blood reached 0.2 per cent. by volume, the drinker showed signs of intoxication. This would require drinking about four "large whiskies." In general, a condition of marked drunkenness exists when the alcohol in the blood reaches a concentration of between 0.1 and 0.2 per cent. From 0.6 to 0.7 per cent. or less may prove fatal and more than this almost invariably does. A man dead-drunk is not very far from real death.

Prof. Gettler, however, does not consider the concentration in the blood so

reliable an indication of drunkenness as the concentration of alcohol in the brain, and for living persons he considers the concentration in the spinal fluid most reliable. When this reaches 0.265 per cent. the person is intoxicated.

But if scientists can thus determine by various tests when a man is intoxicated, they still cannot determine accurately what strength of beverage will produce the effect, since this depends on how much and how fast he drinks and how quickly he absorbs and burns up the alcohol in the beverage. People vary so greatly in their response or resistance to alcohol that what may be an excessive amount to one person may be a mere "snifter" to another.

"A Moderate Dose"

A pharmacologist, Dr. Harold T. Hyman, assistant professor at College of Physicians and Surgeons, Columbia University, has said that a moderate dose of alcohol may be from about two-thirds of an ounce to about one and one-third ounces. At that rate, from two to four glasses of 4 per cent. beer would be a moderate and presumably non-intoxicating dose. But Dr. Hyman admits that either of these amounts might be excessive or very slight, according to the individual drinker's tolerance for alcohol.

Earlier scientists seem to have allowed a slightly more generous amount for a moderate dose, however. In the last century, an English physician, Dr. Anstie, said that a "permissible amount" of alcohol would be about an ounce and a half of absolute alcohol per day. Since absolute alcohol is 100 per cent. alcohol, this would allow about four or five glasses of 4 per cent. beer.

Coming nearer to our own time, Prof. John J. Abel of Johns Hopkins University stated in 1903 that a permissible amount would be a pint of beer or half a pint of light wine a day. However, it is unlikely that either of these physicians were considering the permissible amount solely from the standpoint of permitting an amount just short of intoxication. Other considerations undoubtedly entered in.

"According to laboratory experience," stated Dr. Francis G. Benedict of the Carnegie Institution Nutrition Laboratory, "the equivalent of 20 to 30 cubic centimeters or one to one and one-half ounces of pure alcohol may be taken at one time by the average man, even on an empty stomach, without obvious signs of incipient intoxication. This is quite irrespective of whether the man is used to alcohol or not.

"If we consider the amount of liquid necessary to take into the stomach to furnish one and one-half ounces of pure alcohol in a diluted form, we find that it would require nearly two quarts of liquid. Although of course there are certain bacchanalian artists who can easily negotiate this volume, for the majority of individuals it would be physically impossible to hold enough liquid with a two per cent. content of alcohol to make a man a menace to society from the standpoint of obvious intoxication."

If the liquor were 4 per cent. instead of 2 per cent., only one quart need be consumed to reach the limit of one and one-half ounces of pure alcohol, and, presumably, intoxication. Since one quart of beer or other beverage is quite as much as the average person would take at one time, 4 per cent. would thus seem to be a safe, scientific limit of alcohol concentration in a non-intoxicant.

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MEDICINE

Typhus Investigator Recovering From Disease

DR. W. G. WORKMAN, of the U. S. National Institute of Health, Washington, is now well on the way to recovery from the attack of typhus fever which he contracted during the course of investigations on the disease. Dr. Workman, third of the Institute's staff to suffer from the disease, is reported to have had a much milder attack than that from which his chief on the typhus investigations, Dr. R. E. Dyer, suffered in October of this year.

Science News Letter, December 17, 1932

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ORNITHOLOGY

NATURE RAMBLINGS

by Frank Thone



Remember the Birds

WHEN YOU are preparing for your Christmas feast, remember also the birds. If there is enough snow to make you rejoice in an "old-fashioned Christmas," it will mean a harder Christmas for the birds, a great deal of whose living in winter depends on access to the ground. Therefore spare them the crumbs that fall from your table, which is really all that is required by these brothers of the adoption of St. Francis.

It is better not to scatter your alms for the birds on the ground. If there is snow, that makes the food less wholesome, and much of it is lost. And in any case, it exposes the little feasters to the onfall of cats, who know nothing of peace on earth at any season, nor aught of goodwill toward their fellow-creatures. Rig a flat box, preferably with a shelter from wind and snow, on top of a post. Or better even than that, hang it in the middle of a stretched wire, where it will be safe from pilfering squirrels as well as from murdering cats. And forget not a lump of suet, securely nailed or tied. Birds rejoice in suet as Christmas feasters do in a roast goose or a plum pudding.

We are promised a high reward if we remember the least of the brethren with a cup of cold water. Let us, however, extend our charity toward the little feathered ones just a little further. Warm the water, so that it may stand outdoors the longer before it freezes. And do not set it out in the same pan you have warmed it in: the hot rim may burn the birds' feet. Pour it into another dish, one with an edge suitable for perching, and set it in a protected place. Thirst is often a worse distress than hunger when the world is locked up in ice.

Science News Letter, December 17, 1932

CHEMISTRY

Blue Dye Proves Successful Antidote to Cyanide Poison

A BLUE DYE, methylene blue by name, has proved a successful antidote in cyanide poisoning. It may also be useful in carbon monoxide poisoning.

A patient was brought into the Park Emergency Hospital, San Francisco, completely unconscious after taking potassium cyanide, a deadly poison. Methylene blue was injected into a vein and fifteen minutes later he had completely recovered. In reporting the case to the American Medical Association, Dr. J. C. Geiger, Director of Public Health for San Francisco, pointed out that the use of the dye was the direct result of a survey of the treatment of poison cases of all kinds as practiced by the Emergency Hospital Service of the Department of Public Health. The survey was made by Dr. P. J. Hanzlik, professor of pharmacology at Stanford University Medical School, and Dr. C.

D. Leake, professor of pharmacology at the University of California Medical School.

This survey was requested by Dr. Geiger a few months previously, after the futility of other methods of treatment was shown in three fatal cases of cyanide poisoning. A result of the survey was an outline by Dr. Hanzlik of modern antidotes and appropriate treatment of cases of various types of poisoning. This outline is now in use by the department, with the good results shown in the cyanide poisoning case just reported.

The use of methylene blue and of other dyes was suggested by studies of Dr. Otto Warburg and others, Dr. Geiger said in commenting on the recommendations of Drs. Hanzlik and Leake.

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ANTHROPOLOGY

Palestine Cave Man's Jaw Found at Foot of Mt. Carmel

AN EXTREMELY massive and powerful lower jaw of a Palestine cave dweller has been unearthed in the Cave of the Oven at the foot of Mount Carmel.

Caves of the region near Mount Carmel are being explored for traces of ancient man by a joint expedition of the American School and the British School of Archaeology. The new discovery is reported to Dr. George Grant MacCurdy of Yale University by Miss Dorothy Garrod, British archaeologist who is leading the cave excavations.

The new jaw bone is pronounced by Dr. MacCurdy as new evidence that there were different types of men on earth as far back as the Mousterian period of the Old Stone Age. The unbeautiful Neandertal men of Europe, who lived at that time, had slouching gait, heavy eyebrow ridges, receding foreheads and weak chins. Skeletons of nine Neandertals found in a Palestine cave last spring revealed a different

type. The Palestine cave men had a slouching gait and heavy eyebrow ridges, but their chins were not receding at all, and their foreheads were not nearly so flat as those of their European contemporaries. The jaw which has been added to the collection of Palestine Neandertals agrees in all points with the rest of the Palestine specimens, thus strengthening the view that the skeletons represent a type.

In another nearby cave, known as the Cave of the Valley, the expedition has found remains of a cape or shroud made of the very small shells known as dentalia. A well-preserved necklace of shells and a number of flint implements are other relics from this cave, reported by Miss Garrod.

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Among the projects planned by the government of Iraq are a dam across the Tigris River and a channel from the Euphrates to impound water of that river.

• First Glances at New Books

Medical History

THE STORY OF MEDICINE FROM MEDICINE MAN TO MODERN PHYSICIAN—Victor Robinson—*Albert and Charles Boni*, 527 p., \$5. Dr. Robinson tells the human, dramatic stories of medical progress through the ages, making his characters live as few historians do, and the result is an extremely readable, vivid account which is bound to be enjoyed and remembered. One of many excellent features is the way in which the medical history is presented against the background of general history, so that the reader knows what else was going on in the world at the time any particular discovery or forward step in medicine was made.

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Psychology

MANAGING MINDS—Charles R. Allen and Harry A. Tiemann—*Century*, 286 p., \$2. A book for vocational teachers written by two specialists in that field.

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Zoology

SOME AUSTRALIAN FAUNA—Noel Burnet—*W. A. Pepperday & Co., Sydney*, 31 p., 2s 6d. The founder of the famous Koala Park, where an effort is being made to keep the Koala going, here presents an excellently chosen series of photographs of many of Australia's strange mammals and birds, with brief explanatory paragraphs.

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Comparative Physiology

PHYSIOLOGY OF THE TEMPERATURE OF BIRDS—S. Prentiss Baldwin and S. Charles Kendeigh—*Cleveland Museum*, x+196 p., 5 pl., paper, \$2.20, fabricoid, \$2.85. In this publication is summed up the brilliant work which Mr. Baldwin and his associates have been carrying on for years. It constitutes a really substantial addition to our knowledge of the physiology of birds, a group that has on the whole not received its proportionate share of physiological study.

Science News Letter, December 17, 1932

Marine Biology

THE COPEPODS OF THE WOODS HOLE REGION, MASSACHUSETTS—Charles Branch Wilson—*Govt. Print. Off.*, 635 p., 41 pl., 75c. Because of the importance of the Woods Hole region as a biological headquarters, this mono-

graph will have considerable local use, in addition to its great interest to students of the crustacea and of marine biology generally.

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Physics

THE THEORY OF ELECTRIC AND MAGNETIC SUSCEPTIBILITIES—J. H. Van Vleck—*Oxford*, 384 p., \$7.50. A comprehensive treatment of an important field of physics and mathematics both from the standpoint of classical theory and the new quantum mechanics. A detailed knowledge of quantum mechanics or of spectroscopic nomenclature is not presupposed, although the reader is expected to have an elementary acquaintance with the Schrödinger wave equation. The author is professor of theoretical physics in the University of Wisconsin.

Science News Letter, December 17, 1932

Ethnology

COMPOSITION OF THE CADDOAN LINGUISTIC STOCK—Alexander Lesser and Gene Weltfish—*Smithsonian Inst.*, 15 p. Discusses interrelationships of the four major Indian languages which make up the Caddoan stock: Pawnee, Wichita, Kitsai, and Caddo.

Science News Letter, December 17, 1932

Pharmacology

EXPERIMENTAL PHARMACOLOGY AND TOXICOLOGY—Henry G. Barbour—*Lea and Febiger*, 141 p., \$2.75. A laboratory course for medical students. The work is planned so that no expensive or elaborate apparatus is needed. The topics have been selected with a view to their bearing on clinical needs.

Science News Letter, December 17, 1932

Geology

GEOLOGY OF SANTA CRUZ ISLAND, SANTA BARBARA COUNTY, CALIFORNIA—Carl St. J. Bremner—*Santa Barbara Museum*, 35 p., 3 pl., 2 maps. This publication constitutes No. 1 of a new series: Occasional Papers of the Santa Barbara Museum of Natural History.

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Botany

FERNS OF FLORIDA—John Kunkel Small—237 p., \$3. Florida presents a wealth of plant life, a wealth that is, to a newcomer at least, most baffling. Because of the great climatic range in its 500 miles of peninsular length, and the amazing endemic patches it has here and there, the floristics of the state are even yet only at a beginning. It is encouraging to have this thorough-going book on one special plant group, by a leading authority on Southern botany.

Science News Letter, December 17, 1932

History of Science

THE GREAT BIOLOGISTS—Sir J. Arthur Thomson—*Methuen*, 176 p., 3s. 6d. A pocket-size book, giving rapid but well-balanced sketches of the hierarchy of biological leadership from Aristotle and Galen to Darwin and Mendel. The position of each man as a contributor to science is stressed, rather than details of biography.

Science News Letter, December 17, 1932

Physiology

PROTOPLASMIC ACTION AND NERVOUS ACTION—Ralph S. Lillie—*Univ. of Chicago Press*, xii+417 p., \$3. Physiologists and neurologists will welcome this second edition of Prof. Lillie's important treatise, for the new material which advances in this field since 1923 have made it possible to incorporate.

Science News Letter, December 17, 1932

Psychology

THE LAWS OF HUMAN NATURE—Raymond Holder Wheeler—*Appleton*, 235 p., \$2. Written in terms of the German school of Gestalt psychology by one of its enthusiastic adherents in this country.

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Biology

FUNDAMENTALS OF BIOLOGY—J. W. Stork and L. P. W. Renouf—*Murray, London*, 448 p., 6s. An incisively written, clearly illustrated general text by two well-known English biologists.

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